

PATENT  
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## AMENDMENTS

### **I. Claim Amendments**

Please amend the claims as set forth below.

Claims 1-7. (canceled)

Claim 8. (previously presented) A method for preparing an article having a platinum-aluminide surface region, comprising the steps of:

providing a substrate having a nickel-base superalloy substrate bulk composition and a substrate surface;

depositing a layer of platinum upon the substrate surface, thereafter;

diffusing a platinum from the layer of platinum into the substrate surface, thereafter;

providing a source of aluminum; and thereafter

diffusing aluminum from the source of aluminum into the substrate surface for a time sufficient to produce a substantially single phase surface region at the substrate surface, the surface region having an integrated aluminum content of from about 18 to about 28 percent by weight and an integrated platinum content of from about 18 to about 45 percent by weight, balance components of the substrate bulk composition.

Claim 9. (previously presented) The method of claim 8, including an additional step, after the step of diffusing aluminum, of  
depositing a ceramic layer overlying the substrate surface.

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Claim 10. (previously presented) The method of claim 8, including an additional step,  
after the step of diffusing aluminum, of

annealing the substrate and the surface region.

Claim 11. (previously presented) The method of claim 8, wherein the step of diffusing  
aluminum includes the step of

diffusing aluminum from the source of aluminum into the substrate surface for a  
time sufficient that the surface region has an integrated aluminum content of from about  
21 to about 23 percent by weight and an integrated platinum content of from about 30 to  
about 45 percent by weight, balance components of the substrate bulk composition.

Claim 12. (previously presented) The method of claim 8, wherein the step of providing a  
substrate includes the step of

providing a nickel-base superalloy substrate which is substantially a single crystal  
and has a composition that includes from about 5 to about 16 weight percent aluminum  
and from about 1 to about 8 weight percent rhenium.

Claim 13. (previously presented) The method of claim 8, wherein the step of providing a  
substrate includes the step of

providing a nickel-base superalloy substrate which has a composition selected  
from the group consisting of (a) 7.5 percent cobalt, 7 percent chromium, 6.2 percent  
aluminum, 6.5 percent tantalum, 5 percent tungsten, 1.5 percent molybdenum, 3 percent  
rhenium, balance nickel; (b) 12.5 percent cobalt, 4.5 percent chromium, 6 percent  
aluminum, 7.5 percent tantalum, 5.8 percent tungsten, 1.1 percent molybdenum, 5.4

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percent rhenium, 0.15 percent hafnium, balance nickel; and (c) 12 percent cobalt, 6.8 percent chromium, 6.2 percent aluminum, 6.4 percent tantalum, 4.9 percent tungsten, 1.5 percent molybdenum, 2.8 percent rhenium, 1.5 percent hafnium, balance nickel.

Claims 14-15. (canceled)

Claim 16. (previously presented) A method for preparing an article having a platinum-aluminide surface region, comprising the steps of:

providing a substrate having a nickel-base superalloy substrate bulk composition and a substrate surface, thereafter;

depositing a layer of platinum about 0.0003 inches thick upon the substrate surface, thereafter;

heating the substrate and layer of platinum to a temperature of about 1800-2000°F for a time of about 2 hours, thereafter;

providing a source of aluminum in contact with the substrate surface, the source of aluminum having an activity of about 40 to about 50 atomic percent as measured in a pure nickel foil; and simultaneously

heating the substrate surface and the source of aluminum to a temperature of about 1925-2050°F for a time of from about 4 to about 16 hours to form a substantially single phase surface region.

Claim 17. (previously presented) The method of claim 16, including an additional step, after the step of heating the substrate surface and source of aluminum, of depositing a ceramic layer overlying the substrate surface.

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Claim 18. (previously presented) The method of claim 16, wherein the step of providing a substrate includes the step of

providing a nickel-base superalloy substrate which is substantially a single crystal and has a composition that includes from about 5 to about 16 weight percent aluminum and from about 1 to about 8 weight percent rhenium.

Claims 19-46. (canceled)

Claim 47. (previously presented) A method of forming a thermal barrier coating on a substrate, comprising:

chemical vapor depositing a diffusion aluminide layer on the substrate which includes a nickel base superalloy substrate under deposition conditions effective to provide an outer aluminide layer region comprising a substantially single phase solid solution intermediate phase and an inner diffusion zone region proximate the substrate;

said intermediate phase including an average aluminum concentration in the range of about 18 to about 28 % by weight, an average platinum concentration in the range of about 8 to about 45 % by weight, and an average nickel concentration of about 50 to about 60 % by weight so as to be non-stoichiometric relative to intermetallic compounds of aluminum and nickel, or aluminum and platinum, said outer aluminide layer region being substantially free of phase constituents other than said intermediate phase;

oxidizing the diffusion aluminide layer under temperature and oxygen partial pressure conditions effective to form an alpha alumina layer; and

depositing a ceramic thermal barrier layer on the alumina layer,

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wherein said intermediate phase further comprises a surface, distant from said inner diffusion zone region, and the intermediate phase includes the aluminum content and the platinum content which is relatively high adjacent to the surface and decreases with increasing depth into the intermediate phase.

Claims 48-72. (canceled)

Claim 73. (previously presented) A method of forming a thermal barrier coating on a substrate, comprising:

chemical vapor depositing a substantially single phase diffusion aluminide layer on the substrate which includes a nickel base superalloy substrate, said aluminide layer including an average aluminum concentration in the range of about 18 to about 28 % by weight and an average platinum concentration in the range of about 8 to about 45 % by weight, wherein said aluminide layer further comprises a surface, and includes the aluminum content and the platinum content which is relatively high adjacent to the surface and decreases with increasing depth into the aluminide layer and the substrate; and

depositing a ceramic thermal barrier layer on the aluminide layer.

Claims 74 - 111. (canceled)

Claim 112. (previously presented) The method of claim 73 wherein the aluminide layer comprises an average platinum concentration of about 18 to about 45 % by weight